

The Future of Technology

G. Wayne Clough

President, Georgia Institute of Technology

King & Spalding Executive Forum

March 21, 2000

“We may need six computers worldwide, for government, etc.”

T.J. Watson, IBM, late 1940s

“There is no reason for any individual to have a computer in their home.”

Ken Olsen, Digital Equipment Corp., 1977

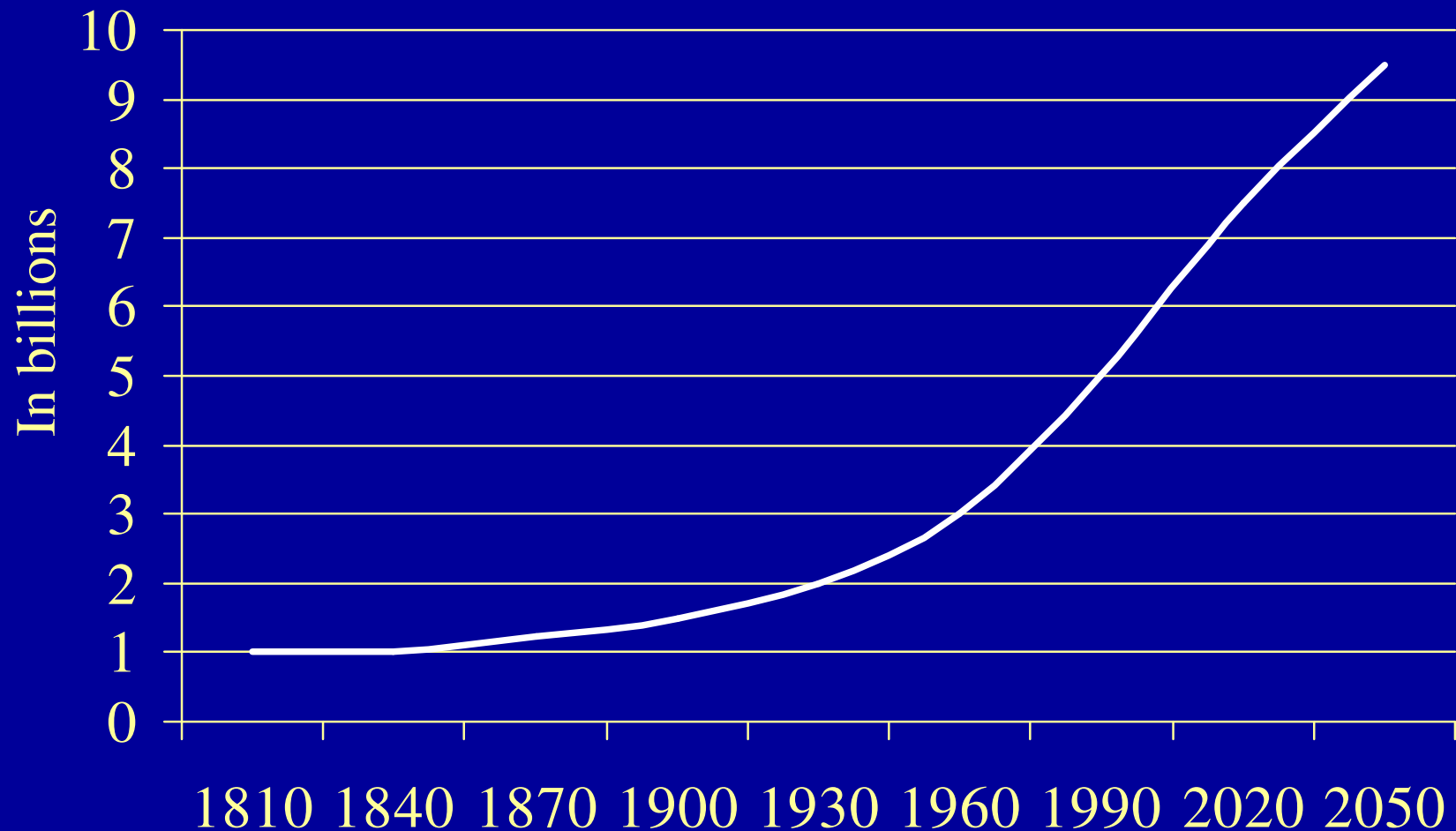
“640K ought to be enough for anybody.”

Bill Gates, Microsoft, 1981

The Gathering Storm

World Population

Can We Absorb 4 Billion More?





The Rivers
Are
Running
Dry

“The world has to significantly increase water production while at the same time restoring the world’s rivers if we are to have any hope of meeting the water needs of 8 billion people while protecting the environment.”

Ismail Serageldin
World Commission on Water for the 21st Century

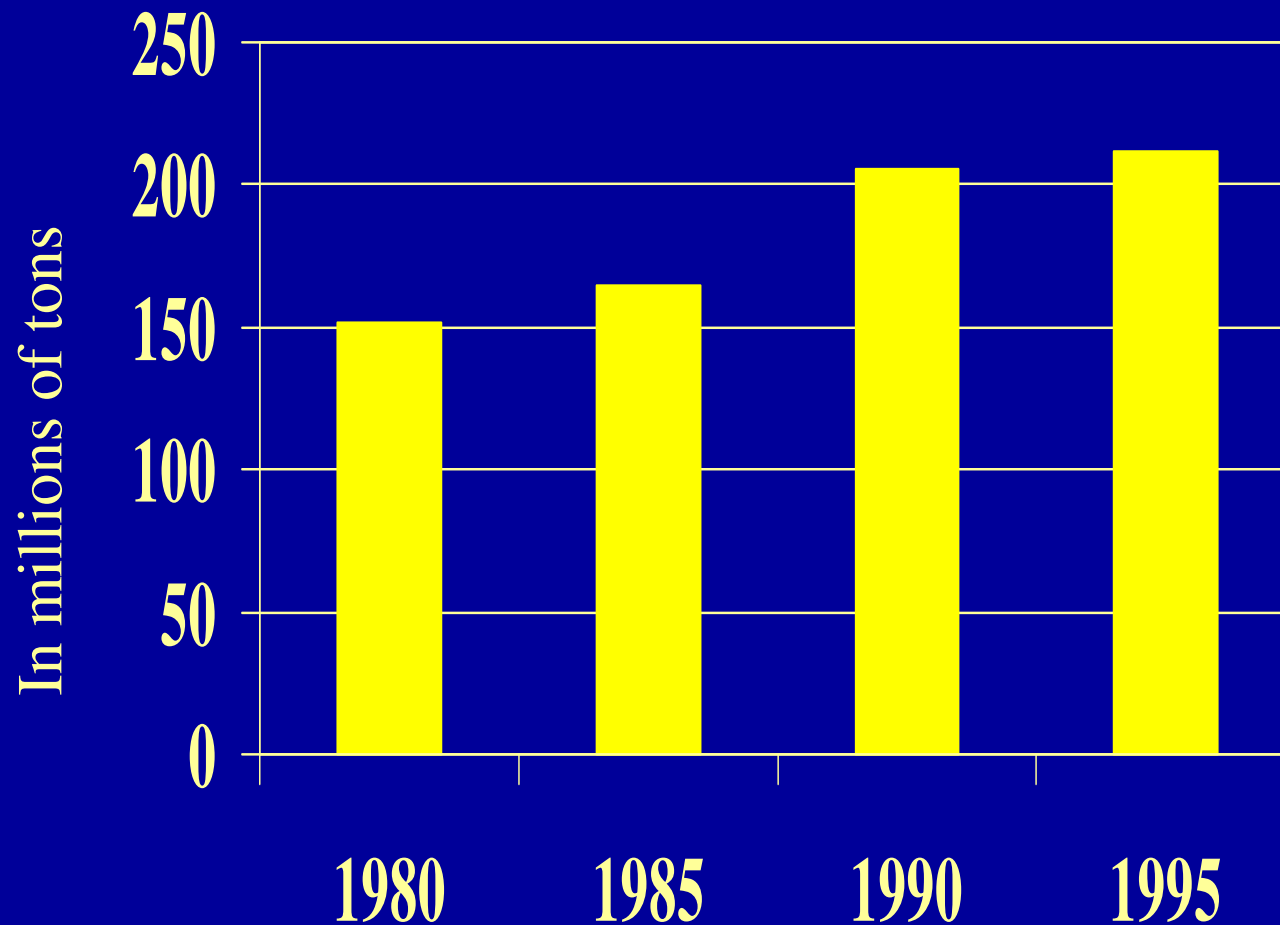
Infrastructure Fails to Keep Up



One million Americans become sick every year from tainted drinking water, attributed in part to the role of decaying infrastructure in encouraging the growth of bacteria.

Centers for Disease Control

Waste Just Keeps Piling Up



Solid Waste Generated in the United States

Transportation Demands Speed Up





Metro Atlanta
was in violation
of federal ozone
standards 23 days
last summer,
second only to
Houston which
had 50 violations.

Commercial Air Travel Takes Off



“By 2015 we can expect to see at least one major airliner crash per week... even if the current statistically safe level of air travel is maintained.”

Walter J. Boyne
Retired Airforce Colonel

Nature's Revenge:

Growing Hazard
Exposure and
Global Warming



There are 40% more intense Atlantic hurricanes now than there were 30 years ago.

Bill McGuire
University College, London

Global warming could increase the destructive power of hurricanes by 40 to 50% by the middle of the 21st century.

Kerry Emanuel
MIT

“More than any other time in history, mankind faces a crossroads: One path leads to despair and utter hopelessness. The other to total extinction. Let us pray we have the wisdom to choose correctly.”

Woody Allen
Side Effects

We need to use technology to
build the safe harbor humankind
needs in the face of the gathering
storm.

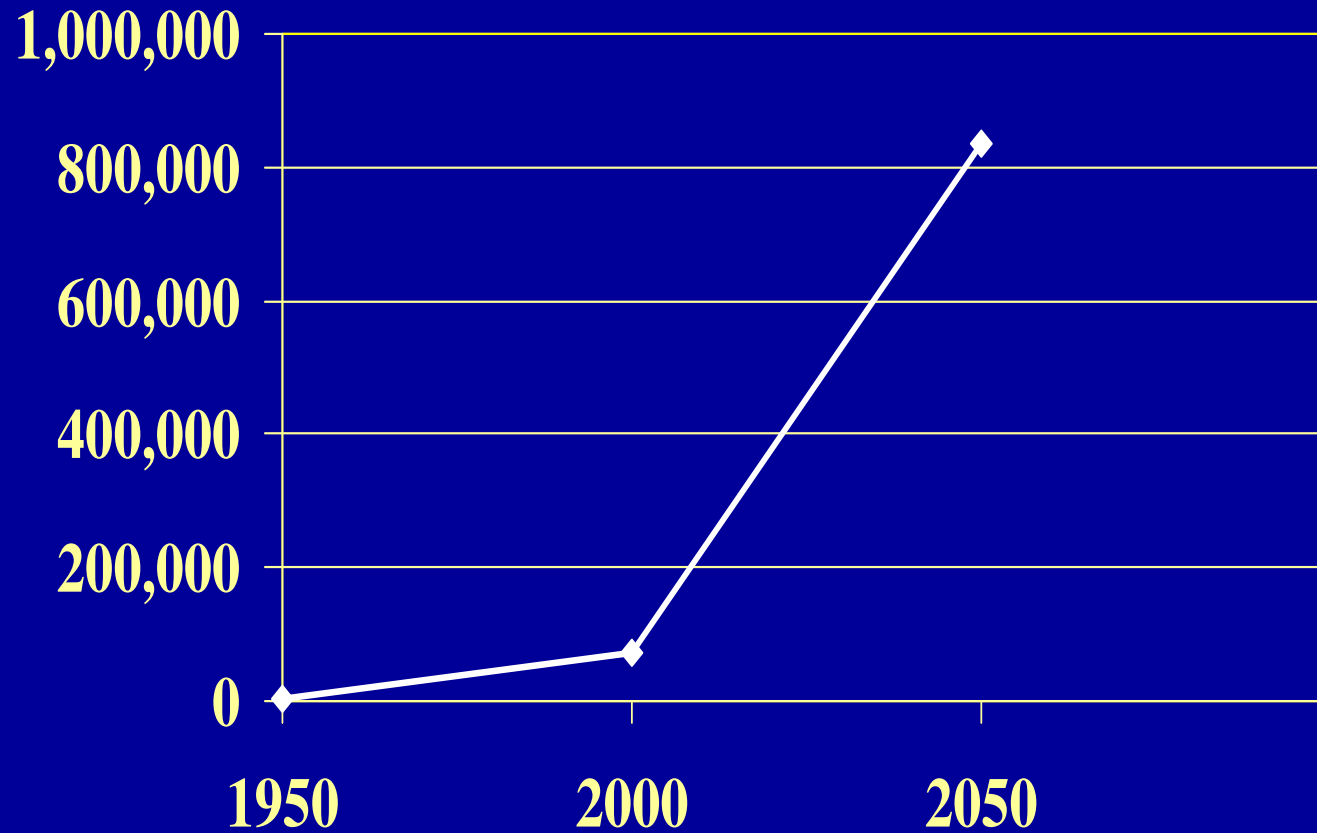
Technological Answers Looking For Infrastructure Solutions




Biotechnology

- Creating artificial implants
- Fixing genetic defects
- Engineering living tissues

American Centenarians*

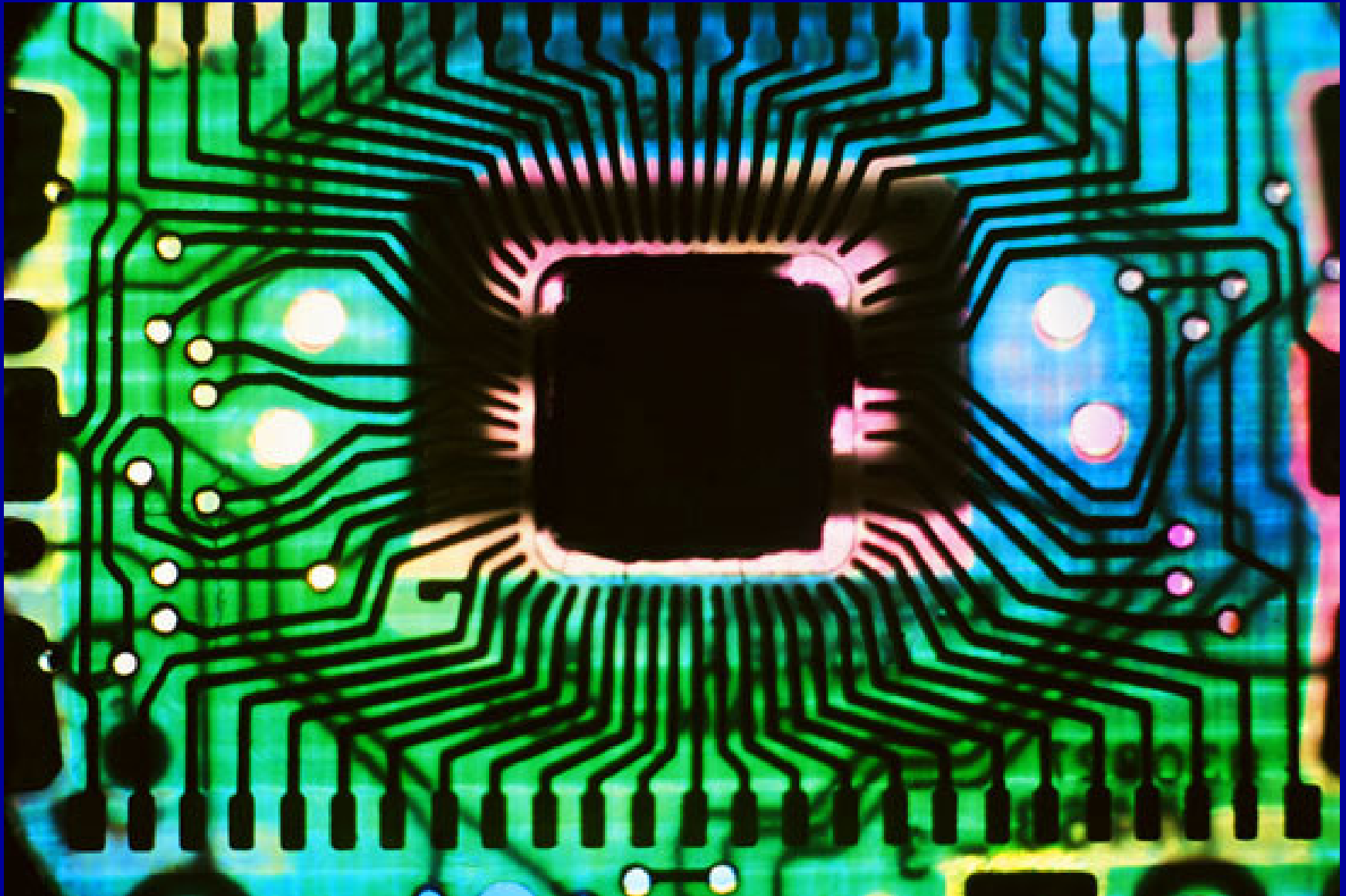


*Persons who are at least 100 years old.

A microscopic image showing numerous dark, irregularly shaped oil droplets of varying sizes. Many of these droplets are being consumed by small, greenish, rod-shaped microbes. The microbes are clustered around the droplets, and some droplets appear to be partially or completely broken down. The background is a light, grainy surface, possibly a slide or a natural substrate. The overall scene illustrates the process of bioremediation, where microorganisms break down oil spills.

**Microbes now clean up
80% of the world's oil
spills.**

Advanced Communications: Do We Get IT?



Today: Virtual
reality with
headgear and
tactile gloves



Tomorrow: Virtual reality with neural implants



Today's structures:
Intelligent as well as good-looking

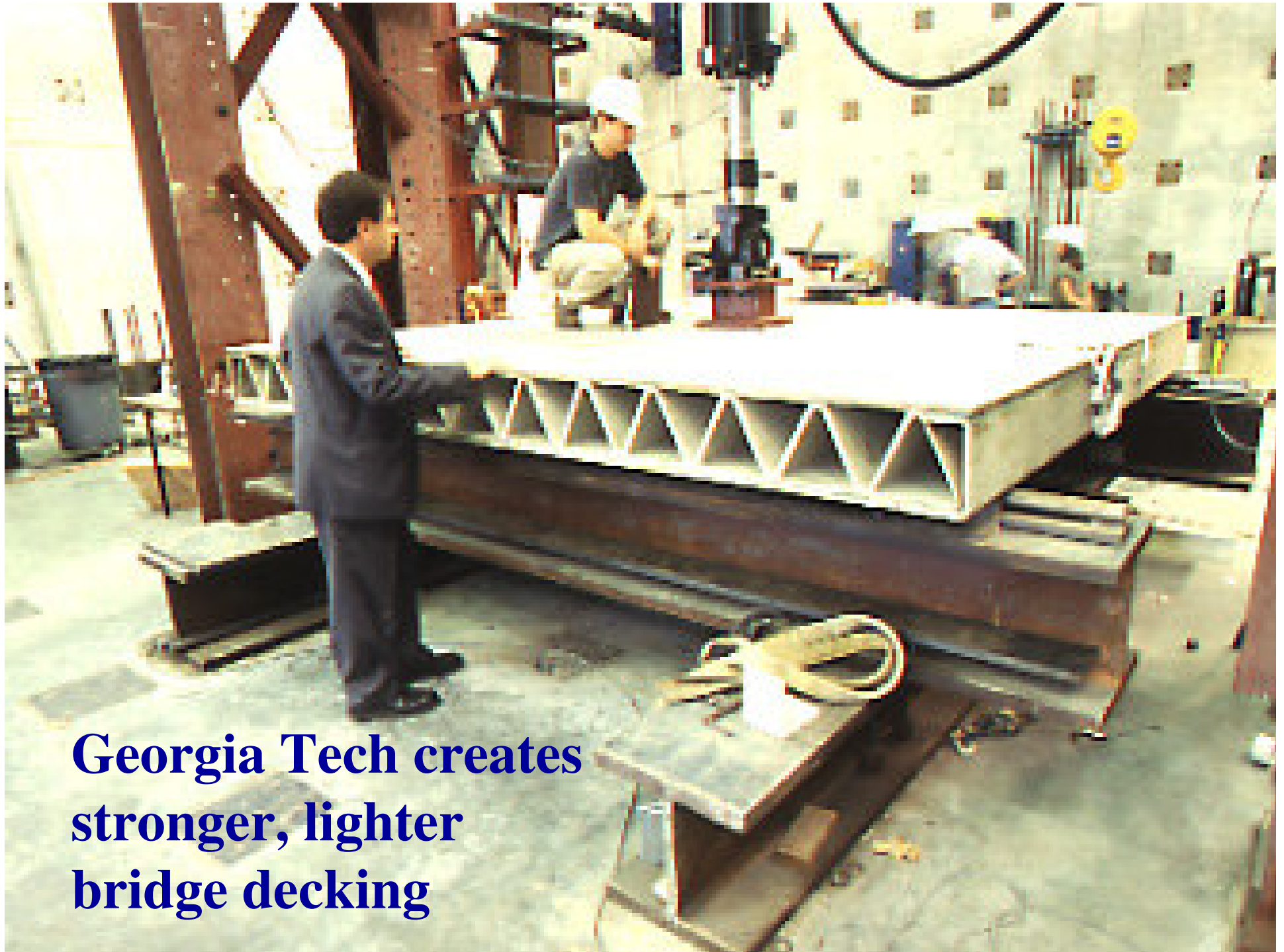




Digital cameras survey Atlanta's expressways, sending a constant flow of images to a computer that manages an intelligent transportation system.

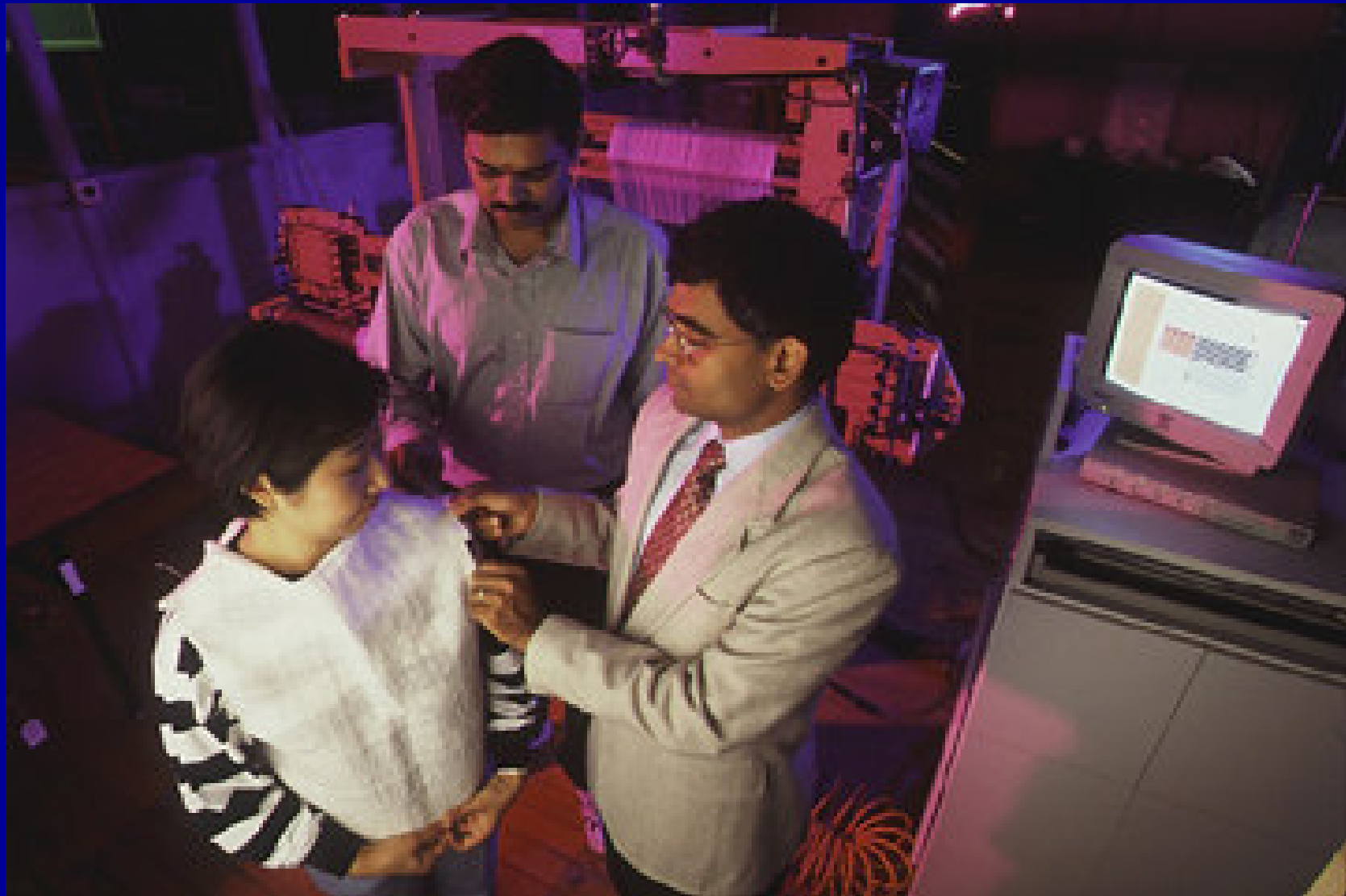
Nanotechnology and New Materials





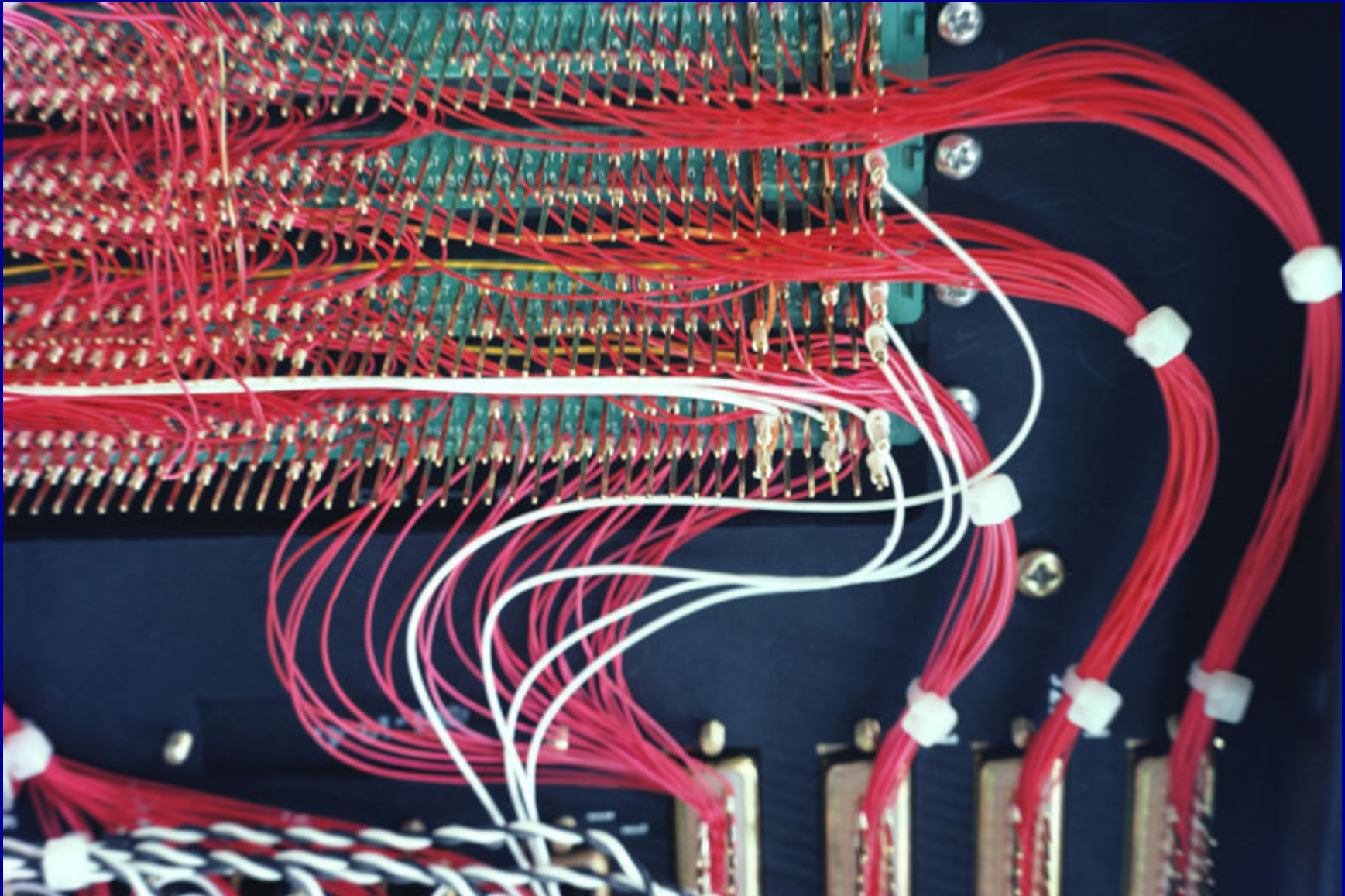
**Georgia Tech creates
stronger, lighter
bridge decking**

“Smart” Shirt Laced with Optical Sensors



New Management Strategies

Taking Business Online



The Boeing 777 has “132,500 uniquely engineered parts with a total of 3 million items. More than half of the airplane was manufactured by 487 U.S. suppliers and 58 suppliers in 12 nations... Powerful digital computer-aided design technology enabled designers to create the 777’s parts and systems as three-dimensional images... eliminating the need for a costly full-scale mockup of the plane.”

Philip H. Abelson
Science Magazine

Environmental Sustainability



“The environment is not a competing interest; it is the playing field on which all other interests intersect.”

Peter Dunne
The New York Times

“The world is very different now,
for man holds within his two
hands the power to destroy all
forms of human poverty and the
power to destroy all forms of
human life.”

John F. Kennedy

“We can create insurmountable problems in almost no time flat. We must do more thinking up front if we are not to be surprised and shocked by the consequences of our inventions.”

Bill Joy
Wired Magazine, April 2000

The first step
toward
achievement
is to
acknowledge
the challenge.

